

James Acker:

Thank you again, Jan. Maksym Petrenko will be presenting on MAPSS now.

Jennifer Wei:

Sure, Jim. Maksym, I will stand by if anyone has questions

Maksym Petrenko:

Ok, loading now.

James Acker:

You have the controls, Maksym.

Maksym Petrenko:

Faster than expected. Nice.

James Acker:

Ready to begin?

Maksym Petrenko:

So, this presentation will be on 2 or even 3 of the last projects Greg was working on.

We used to include him as a co-author on this presentation, but oh well.

So, essentially, this work is on aerosols, the tiny particles in the atmosphere that can have a major impact on the global climate, as well as at local scale on health and so on.

There are quite a few satellite sensors measuring aerosols, the best known MODIS and MISR, but there are many more, and we would like to eventually bring them together.

Giovanni already supports aerosol products from many sensors, and one of the ways to compare the products is to generate Giovanni plots or imagery, like in this picture comparing MODIS Aqua, Terra, and MISR Terra. You can see that some features match across the sensors, but some not.

In part, this is due to the fact that Giovanni supports mostly Level 3 data, where the retrievals from the sensors have been aggregated to 1x1 degree grid, and averaged across a day or longer. This results in a lot of discrepancies, because of the very different characteristics of the sensors. For example, the sensors have a different time of overpass.

When aggregating to a daily composite, the time of the overpass, as well as the definition of the date crossing line results in somewhat different Level-3 products.

And when you try to compare these products, you might see some differences, which in fact are not differences at all, but rather the artifacts of the aggregation, like the clear artifact on the date crossing line when comparing MODIS and MISR products on the slide.

What's more, Level-3 data is not very useful (i.e., it is too coarse) when validating aerosol products.

As a standard reference, it is desirable to use observations from AERONET and other ground-based stations, which, essentially, produce point-data observations (that is, the measurements are taken many times a day, but represent only a small area).

I would be nice if we could support such data in Giovanni, as was mentioned several times during yesterday's round of the presentations.

To tackle this problem, we designed MAPSS system that uniformly samples Level-2 (retrieval level) aerosol data from multiple satellite sensors around AERONET and other locations.

Although designed as a stand-alone data system, we worked on integrating MAPSS into Giovanni.

The next 10 slides will be on MAPSS, and 10 more - on how it works in Giovanni.

This slide is just to give you an idea how many Level-2 pixels from each sensor can fit into MAPSS sampling area

Note that area is uniform across all sensors, to ensure we are 'comparing apples to apples'

This is the coverage of MAPSS sampling locations. Basically, AERONET locations, plus some additional sites of interest. The map is actually generated from Giovanni.

For each sample, we calculate a set of statistics, as outlined on this slide, the most important being mean value, and central value (the value of the pixel in the center)

We also compute and record additional data, like data provenance and Quality Control information, which are quite important when you need to troubleshoot a specific anomaly in your analysis.

Based on this statistics, we generate comma-separated files and store them away. It takes several month to generate the data for all sensors and locations, but once done - you can do all kinds of nice analysis on them.

For example, you can study correlation of individual aerosol products to AERONET at a specific location

Or zoom in on a particular day and see which sensor gives you the best measurements (or some measurements at all)

Or study problems in retrievals by using information from other sensors. Here, we study the scale of AOD errors based on the number of aerosol layers, as retrieved by CALIOP

The QA support is very important too. Without it, you get a lot of noise.

Now, once generated, the MAPSS data can be served by Giovanni - the bottom part of

the diagram

And that's how it looks like.

You can select parameters (hundreds from each sensor), fine -tune QA parameters, set up filters and so on.

Most importantly, it is all commented and simplified as much as possible, to ensure it is easy and intuitive to use.

This is especially important since it is very hard to keep all that information in mind.

For example, QA schemas used in different products are quite different and scattered across documentation

Once you select the parameters, you can generate several types of plots

Or generate a custom MAPSS file that you can later plot in Excel

This is simal to what I showed before, but done by the tool, thus saving a lot of time and effort

Something else that we were working with Greg right before he left us was the collaborative system for Giovanni

Here, you can create a plot in MAPSS and share it with your colleagues Facebook-style

if you see an anomaly, you can even highlight and annotate it, as Greg did in the picture on the right

We also created a 'sister' portal of MAPSS called AeroStat

AeroStat has fewer parameters than MAPSS, but allows to study them in detail

And also bias-adjust aerosol measurements based on neural network analysis

The look is very similar to MAPSS

Note that we experimented with a lot of features, to be supported in Giovanni -4, like annual repeating months

We also implemented a prototype support for Level -2 data. Here, the plot was generated on the fly from MODIS Level-2 data. It can be customized by the user and bias-adjusted by NN as well

I will skip this slide

There were a lot of things that we were working on with Greg.

They are not done yet, and we will continue on them with the excellent members of Giovanni team.

I am done, thanks. Any questions?

James Acker:  
Thanks, Maksym.

Dimitris Kaskaoutis:  
since I missed some slides, is there AEROSTAT in the current Giovanni version?

Jennifer Wei:

That is correct. It is available now, but it is implemented using Giovanni 4.

AeroStat is in G4.

<http://giovanni.gsfc.nasa.gov/aerostat/>

Essentially, it is one of the first instances of G4, but it works in G3.

Maksym Petrenko:

Thank you Jen

And MAPSS is <http://giovanni.gsfc.nasa.gov/mapss/>